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**Research Report**

## How to make global supply chains more resilient

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## Columbia FDI Perspectives

Perspectives on topical foreign direct investment issues

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### How to make global supply chains more resilient

by

Gary Gereffi\*

Global supply chains (GSCs) have become a hot topic, ranging from pandemic-induced shortages of personal protective equipment and COVID-19 vaccines to military logistics, oil sanctions and wheat blockades following Russia's invasion of Ukraine. Most recently, the Biden administration targeted the US semiconductor industry with direct subsidies in the August 2022 [CHIPS and Science Act](#). On the diplomatic front, US Secretary of State Anthony Blinken and Secretary of Commerce Gina Raimondo hosted a [2022 Supply Chain Ministerial](#) with 17 partner economies and the European Union on July 19-20 in an effort to build resiliency through greater international cooperation. Supply-chain diplomacy involves both bilateral and multilateral initiatives addressing current vulnerabilities, including the [US-EU Trade and Technology Council](#), the [Indo-Pacific Economic Framework](#) and the [Americas Partnership for Economic Prosperity](#).

Post-pandemic, companies have four main options to reduce rigidity and [increase resilience](#) in GSCs: make them more *domestic* (e.g., reshoring, stockpiles); make them *shorter* (e.g., reducing the physical distances traversed by supply chains through [regionalized production](#), such as Mexico and Central America for the US); make them *more diversified* (e.g., reduce dependence on one or a few countries); and make them more [digital](#) (e.g., digital versions of real products and using digital technology to track the supply chain better).

Governments can support these initiatives in the longer term by following several principles outlined in extensive research carried out on GSCs, innovation, and development.<sup>1</sup>

- *The most important product in GSCs often is not the finished good, but rather key components or raw materials.* Semiconductor shortages are a classic example because they

are critical inputs for many end-product industries, from advanced electronics to automobiles and home appliances. Similarly, pharmaceutical active ingredients are key for essential medicines, while scarce minerals like lithium and cobalt are needed to make batteries for electric cars and smartphones. Emphasizing critical technologies and geographic shortages can help both governments and companies anticipate and overcome supply-chain vulnerabilities.

- ***Focus on solutions for high-priority markets.*** Mature products may have greater opportunities for quick gains than advanced products. While cutting-edge semiconductors require large investments in new and costly wafer-fabrication facilities, the shortage of “legacy chips” used in mature products like cars and appliances might be addressed more quickly by retooling existing factories or alternatively redesigning chips for existing production facilities.
- ***International production partnerships are often necessary.*** Contemporary GSCs can be staggeringly complex, requiring intricate cross-border trade and investment collaboration. For example, the COVID-19 vaccine developed by BioNTech and Pfizer involves 280 components from 86 suppliers sourced from 19 countries around the world. Furthermore, [vaccine manufacturers](#) follow very different production strategies with numerous international partnerships. AstraZeneca has formed [manufacturing partnerships](#) with 16 contract manufacturers in 25 sites in 15 countries, and transferred technology to the Serum Institute of India, the largest vaccine producer in the world. Without such partnerships, which are utilized in most industries, governments could not handle the diversification, speed and scale required by global crises.
- ***Human capital is critical for resilient supply chains.*** The US [Government Accountability Office](#) concluded that the most significant long-term strategy to address supply-chain shortages in semiconductors and other industries was workforce development. In the new semiconductor fabs being built in the US, including those likely to be supported by the CHIPS and Science Act, skills shortages are critical chokepoints.<sup>2</sup> The good news is that government policies to improve supply-chain resilience, such as training people to avoid skills shortages (e.g., cybersecurity) as well as building skills to fill available jobs, can boost earnings and productivity. [Intel’s two new semiconductor factories in Ohio](#) are expected to employ 3,000 workers with an average salary of \$135,000 per year.
- ***Reshoring or making supply chains more domestic does not guarantee resilience.*** While the breakdown of GSCs has [spurred calls to bring the production of critical goods back to domestic shores](#), often this is not feasible technologically, and it would decrease the benefits of geographical diversification (e.g., for agricultural goods, energy grids or complex manufactures). Selective reshoring is possible and domestic stockpiles can be utilized, but they must be managed very carefully.

Reorganizing supply chains to enhance strategic competitiveness and building a workforce with the needed skills for 21<sup>st</sup> century development is the best path for effective international and public-private partnerships. Both governments and companies play mutually supportive roles in advancing this critical objective.

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<sup>1</sup> This draws on insights from the voluminous academic literature on global value chains that tracks how, where and by whom value is created, captured and eroded in GSCs. See, e.g., Gary Gereffi, *Global Value Chains and Development: Redefining the Contours of 21<sup>st</sup> Century Capitalism* (Cambridge: CUP, 2018); Stefano Ponte, Gary Gereffi and Gale Raj-Reichert, eds., *Handbook on Global Value Chains* (Northampton: Edward Elgar Publishing, 2019).

<sup>2</sup> Of the projected employees in the typical advanced semiconductor plant, 70% will require two-year technical college degrees, 20% M.A. degrees and 10% Ph.D. degrees.

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